How to blend language and ICT in the didactics of scientific translation

Francisca Suau-Jiménez
Instituto Interuniversitario de Lenguas Modernas Aplicadas (IULMA)
Universitat de València
francisca.suau@uv.es

Laura Ramírez-Polo
Dpto. de Teoría de los Lenguajes y Ciencias de la Comunicación
Universitat de València
laura.ramirez-polo@uv.es

1. Introduction

New information and communication technologies (ICT) have burst into all spheres of our lives, modifying them in ways inconceivable barely ten years ago. Generally speaking, these modifications have enhanced interaction processes (telecommunications), work and human production (task automation). The field of professional translation has been particularly affected by this technological revolution and has led to new research, professional and didactic paradigms, known as Automatic Translation and Computer Aided Translation. This is the framework for our present work, which attempts to put together the development of communicative (linguistic) competences with procedural (instrumental) and evaluative ones (professional translation self-assessment) in the didactics of scientific and technical translation. In the same vein, other chapters in this work attempt to contribute to this blended field of ICT and language applied to translation (Maruenda-Bataller & Santaemilia-Ruiz; Robles-Sabater; Candel-Mora). They indicate that translators cannot be adequately trained without taking into account the necessary union of these two fields at least.

Thus, our proposal aims at raising awareness on the blending of language and technology from the principle of Computer Aided Translation, that is to say, the situation where the translator, being aided by software tools and the internet, optimizes his/her work. This caters for the automation of repetitive aspects of translation, allowing him/her to concentrate on the pure translation of texts. We build upon previous works such as Austermühl (2003) and Pérez González & Rico Pérez (2001), since both authors agree on the importance of commanding both technological and linguistic competences to achieve good translations.

Through a close replica of the task of a professional translator, translation trainees use a variety of tools which are presented in the classroom following Melby's (1998) model that we have adapted to our own teaching conditions. Training focuses on three phases: previous to, during and after translation, we apply specific tools to terms and to segments. These tools include, among others, a translation memory and terminological resources. The Internet is another crucial tool, used in this case to access lexical databases, dictionaries and on-line encyclopaedias, as well as Google itself as a search engine, to find websites for parallel texts and translations which indicate the way in which terms, collocations, phrases and clauses have been translated (e.g. www.linguee.com, dictionary and translation search engine) and their different styles.

The linguistic part of this work is based on the identification of recurrent terminological and discursive structures and segments that the translation trainee will have to identify and store in a translation memory and terminological tool in order to use them in further translations. These discursive structures and segments are, on the one hand, *genres* and *communicative functions* –verbal actions-, common to the same genre, such as description, explanation or exemplification in the research and in the popular science article. On the other hand, there are *interpersonal markers and expressions* (hedges, boosters, etc.), which are the realization of the interactional metadiscourse, giving account of the relation between author and reader, according to politeness principles established by scientific discursive conventions (Alcaraz-Varó, 2000; Suau-Jiménez & Ramírez-Polo, 2008 & 2010; Suau-Jiménez 2010a). As for the terms, also known as technical and semi-technical vocabulary (Hutchinson & Waters, 1987), which are pervaded with meaning coming from specific semantic fields or knowledge domains, a terminological tool must be used for processing. These terms can be single or multiword units, since semantic precision and specialization often demand the union of more than one word forming a single lexeme (Cabré, 1999; Alcaraz-Varó, 2000).

To sum up, our objective is that translation trainees acquire the adequate linguistic and instrumental competences, which will surely reinforce each other when learned in a combined way, leading to better and faster translations. Storing and tagging linguistic structures that repeat because they belong to a limited series of genres –those taking place within the field of science and technology-, as well as terminological occurrences, will undoubtedly facilitate their retrieval for translation purposes. As a result, translations will be carried out with a closer adjustment to each genre's discursive and terminological

requirements and also with an enhanced time management, an essential aspect when delivering translations.

2. Discourse analysis and translation

Linguistic analysis applied to translation has been extensively researched and written about (Hurtado-Albir, 1994; Schäffner, 2002, 2004; García-Izquierdo, 2000, 2002, 2005; Nord, 2005; Suau-Jiménez 2010a, to name only a few). These authors coincide in claiming that translation instruction needs to be solidly rooted in linguistic theory, since it is false that "the more you translate, the better they'll be". Translation students and trainees need to know about the social relevance of translations as well as about their field of epistemics through different theoretical approaches; one of these is the linguistic one. There are several linguistic aspects which need to be covered, although not all have to be necessarily included within the same linguistic analysis approach to translation. Schäffner (2002, 2004) advocates in her linguistic claim for syntax, semantics and pragmatics in relation to speech acts, function of the text, cohesion and coherence, theme and rheme and finally, genre. Discourse analysis seems to be one of the most important linguistic theories students must engage, as long as it is oriented towards a translation aim and attempts to unveil textual external and internal features (Schäffner, 2004). Thus, García-Izquierdo (2005) insists on the importance of a high degree of proficiency in the first language, which can be acquired through the analysis of a variety of text genres. In her Introduction, Nord (2005:1), from a functional discursive perspective of translation, suggests that "before embarking upon any translation, the translator should analyse the text comprehensively, since this appears to be the only way of ensuring that the source text (ST) has been wholly and correctly understood". Further on (2005:8), she adds that "being culture-bound communicative signs, both the source and the target text are determined by the communicative situation in which they serve to convey a message". In other words, apart from an obvious approach to terminology, genre and discourse seem to be central linguistic concepts, since most authors agree upon their significance in translation, let alone specialized translation. Taken as frameworks when analysing a text, they can provide reliable discursive foundations for decisions that need to be made during the translation process.

3. Terminology and scientific translation

As for terminology within the scope of scientific translation, it goes without saying that trainees need to master it as much as possible, since any specialized field of translation is deeply rooted into different representations of meaning with intricate sub-fields permeated by

theoretical knowledge (Cabré, 1998, 2010). The field of science –including the so-called *popular science and technology*- has had an unprecedented development from the 20th century onwards, pervading many social, professional and cultural domains (Halliday &Webster, 2004); hence, the heavy burden of terminology and scientific lexis in general, which has been the subject of numerous neology processes, giving way to the coinage of new terms. The relatively new areas of *popular science and technology*, together with the internet, have yielded an explosion of printed and online journals in the English language (Scientific American, The New Scientist, SciTech, etc.) which, in many cases, have provided material for translation into Spanish and other languages. Therefore, in a proposal aimed at adequately training future translators, terminology has to be an essential part, as much as discourse analysis rightfully is. .

4. The field of Science: discursive features and genres

A discursive overview of the field of Science can be approached from Widdowson's (1979, cited in Suau-Jiménez, 2005) classification, leading to three discourse types:

	Focus	*on discourse types*
a.	science as subject	scientific instruction
b.	science as discipline	scientific exposition
c.	science as topic	scientific journalism

Given that the genres of interest for our work are the Research Article (RA) and the Popular Science Article (PSA), it is wise to think that RA matches with "science as discipline", corresponding to the discourse type "scientific exposition" and PSA with "science as topic", corresponding to the discourse type "scientific journalism". These varieties of scientific discourse are ways in which scientific knowledge is communicated. Therefore, it can be assumed that

> […] both discourse varieties have in common the fact of having an audience (interpersonal macro function – the social world) wishing to be informed about certain facts (ideational macro function – the mental world) but also to be convinced and persuaded and, in the case of Popular Science, also to be entertained by means of language (textual macro function – the physical world), if we follow Hallyday's (1978, 1984) postulates. (Suau-Jiménez, 2005)

Within the genre scenario, Fairclough (2003) has contributed new insights when revisiting the concept developed by Swales (1990), and has suggested that texts are part of social events or the linguistic way in which people act and interact socially. Authors and their audience are seen as social agents whose actions are socially constrained. Then, scientific writing can be seen as a social event concerning epistemic change, where the reader's knowledge is altered by means of his/her pragmatic interpretation. For Gazdar (1981:69), a scientific assertion has to persuade an audience, since it changes "a context in which the speaker is not committed into a context in which s/he is so committed". Research Articles (RAs), it should be said that Hyland (1998) describes them as rhetorically competent products through which scientific knowledge is negotiated and ratified. From all these assertions and suggestions over the discursive view of scientific texts, one should conclude that writers must be aware of their audience's background knowledge and anticipate their reactions to the text. Also, PSAs can be regarded as social constructs belonging to the field of journalism since they regard science as a topic. De Semir's (2000: 125) view is interesting to unveil the nature of PSAs as mass media products that do not report reality but create it, since their final purpose is to spark debate and emotion in their audience. Following with De Semir (2010: 11-13) a distinction is made between "science communicator and scientist communicator" as two roles that produce two types of discourse. Science communicators are specialized journalists, concerned with the craft of writing, who purvey discoveries, predictions and controversies that scientists yield. Scientist communicators, on the other hand, offer a unique point of view and a pool of knowledge which is often unmatched by most science communicators. The implications from these two roles lend support to the two genres we claim as the most representative of today's science discourse: RA and PSA, and hence are worth using because of the variety of text realizations to train future scientific translators.

5. Functions, interactional communication and terminology in RAs and PSAs

Besides the above mentioned ICT resources and procedures, genre functions, interactional communication and terminology are, in our view, crucial linguistic aspects that, when mastered, allow us to approach translations from a more complete methodological perspective. When handling a translation, genre and its discursive functions are the first step to be born in mind, since genres within scientific and technical fields display a different array of functions between them. As for genre, we draw from several works, like Swales (1990), Bhatia (1993) and Askehave & Swales (2001) as fundamental genre theorists. They see genre

as goal-directed and purposive, where "purpose interacts with features of text at every discursive level" (Askehave & Swales, 2001: 195). As embodied in our proposal, interactional communication is the second linguistic aspect to be dealt with when training translators. As stated before, authors and their readers are immersed in a metadiscursive relationship which is a direct result of the genre and register tenor. Following tenor conditions for each text (expert/expert, expert/general public, semi-expert-general public, etc.), there is a series of language traits which must be reflected in the text itself. According to the genre category and language, authors relate with their audience following certain prescriptive markers and expressions (Suau-Jiménez, 2005b, 2005c) which establish a more direct or distant interactional communication, serving the genre purpose. These laws are thus, cross-linguistic and cross-generic, different in English and Spanish with respect to RAs and PSAs. For translators, it is crucial to take into account these metadiscursive laws and identify the different interactional patterns of the source and target language, otherwise the final translation may lack the appropriate language in use and hence quality may diminish. Interactional markers are also recurrent elements that can be processed and stored with the tools we propose. Finally, terminology and vocabulary characteristics are the third step within the language analysis approach that we think is necessary in training translators. The field of science is highly pervaded with technical (terminological) and semi-technical lexical items that represent all the meaning input of texts. Each scientific field deploys its own array of concepts that construe a given discipline, especially the so-called "serious science", where the lexical burden is crucial for scientific communication among experts. Popular science is, for obvious reasons, not so prolific in terminology since its tenor is between semi-experts (science communicators) and lay people. However, a certain amount of technical and semi-technical words is included in PSAs. Given that collocations and noun phrases made up of several elements are crucial lexical features in building meaning within science, it is crucial to train translation students to adequately identify them. Accordingly, these three aspects: generic functions, interactional markers and terminology and vocabulary structures need to be mastered before translating scientific texts. This is why our methodological approach contains them.

To illustrate our proposal, we describe RA's and PSA's features and identify their recurrent linguistic elements through discourse analysis (functions), interactional metadiscourse (markers) and register (grammatical traits and vocabulary characteristics). The text samples for RAs and PSAs that are shown below have been drawn from the same fields

or disciplines (bio-medicine and neurology), in order to highlight differences between both genres and their implications for ICT tools when training translators.

Features of a *Research Article (RA)*

- Main functions: description, explanation, exemplification, reference quotations.
- Grammar and syntax: multi-word noun phrases, passive voice, complex sentences.
- Vocabulary characteristics: terminology (technical) and semi-technical units. Multiple Latin-rooted terms. Abundant collocations of two and more elements.
- Metadiscourse: typically academic, linguistic politeness and many hedge markers in the form of conditionals and modals, as well as epistemic verbs. Distant relationship with reader.

As can be observed in RAs, terminology and lexical structures occupy an important part of texts. Functions and interactional markers are more servers of terminology. In other words, the lexico-semantic burden is extremely high. This is due to the RAs communicative goal, to present new findings to the scientific community. Concepts and ideas are transmitted from experts to experts, thus the complex terminology and lexical structures (many noun phrases). Also, the syntax is complex, since ideas need to be contrasted, explained, etc. The interactional function is subject to the conventions of scientific discourse, e.g. hedging statements through a subtle politeness filter, in order not to impose ideas but suggest them.

RA's SAMPLES FROM TWO DIFFERENT FIELDS THAT SHOW RECURRENCE IN FUNCTIONS, INTERACTIONAL COMMUNICATION MARKERS AND TERMINOLOGICAL/LEXICAL ELEMENTS

Legend: 1. *Functions*

2. *Interactional (metadiscursive) markers*

3. ***Terminological/lexical elements (technical and semi-technical)***

Sample no.1

JOURNAL OF BIO-MEDICINE

Selective Expansion of CD34+ Cells from Mouse Bone Marrow Cultured on LH/P MP Coated Plates with Adequate Cytokines

http://tej.sagepub.com/content/early/2011/10/18/2041731411425419.full

Introduction

Cellular expression of the ***CD34 antigen*** *identifies* a morphologically and immunologically heterogeneous ***cell***

population that *is functionally characterized by* its ***in vitro capability*** to generate ***clonal aggregates*** *derived from* early and ***late progenitors*** in ***hematopoiesis*** and its ***in vivo capacity*** to reconstitute the ***myeloid hematopoietic system*** in a ***supralethally irradiated host***.1On the other hand, *there are several recent reports that* a certain ***CD34+ cells*** form cooperative vascular networks as ***endothelial progenitor cells***,2 and human ***CD34+ cells*** *have been used in* clinical trials for treatment of ***myocardial infarction***.3Furthermore, ***synergistic actions of CD34+ hematopoietic cells and mesenchymal stem/progenitor cells in vascularizing bioengineered tissues*** have been reported.4 Thus, ***CD34+ cells*** *are important cells for* ***vascularizing bioengineered tissues*** as well as transplantation of ***bone marrow***. ***Bone marrow and peripheral blood*** *are the sources of* ***immature hematopoietic precursors identified as CD34+ cells***.

CD34+ cells undergo ***regulated proliferation***, conservation, and differentiation in the ***bone marrow microenvironment***. Therefore, the ***cell pool*** *can be preserved* while allowing controlled ***cell proliferation and differentiation***.9,10 ***CD34+ cells*** *are localized in* ***stem cell niches*** and local area networks in the ***microenvironment***, where *they interact with the components of* their ***niche***, including ***stromal cells, extracellular matrix proteins, heparan sulfate proteoglycans, and cytokines***. ***Regional variation*** in these components within the ***hematopoietic microenvironment*** *may create* ***niches*** *that are specific to* ***cells*** at various ***stages of differentiation***.11–13 However, the identity and structural characteristics of ***macromolecules*** that mediate the formation of these ***niches*** *are not well known*. In addition, a method for selecting **ex vivo amplification of CD34+ cells** from ***bone marrow*** *has not yet been established*.14

Because ***heparin and low-molecular-weight heparin (LH)*** *are known to interact with* a variety of ***functional proteins***, such as ***growth factors, cytokines, extracellular matrix components, and adhesion molecules***,21,22 heparin *could be used as* a ***therapeutic agent*** for various pathological conditions in which these ***functional proteins*** are involved.23 However, high-dose ***heparin*** *cannot be used because of* the excessive risk of bleeding.24 In contrast, LH has pharmacological and practical advantages as well as low ***protein binding***, *which produces* a low, stable, and predictable ***anticoagulant*** response, *thereby obviating the need for* laboratory monitoring for ***dose adjustment***.25. In addition, one or two ***subcutaneous injections*** per day *are sufficient to* maintain ***therapeutic concentrations*** because of the ***long plasma half-life of LH***.25

On the other hand, ***protamine***, a ***purified mixture of proteins*** obtained from fish sperms, neutralizes ***heparin*** and LH by forming a ***stable complex***, which lacks ***anticoagulant activity***.26 ***Protamine*** *is also used* clinically as an antidote to reverse the ***anticoagulant activity of heparin*** following ***cardiopulmonary bypass*** and in cases of ***heparin-induced bleeding***.27 In this study, we used ***LH*** (for comparison with ***heparin***) as a ***heparinoid***, and ***protamine*** to prepare ***LH/P MPs***.28 *The purpose of this study is to evaluate* ***LH/P MPs*** as a ***stem cell niche*** for the controlled release of ***hematopoietic cytokines***, which stimulate the selective growth of ***CD34+ cells***. *We report here that* ***CD34+ cells*** derived from mouse ***bone marrow*** *exhibited a significantly higher* proliferation on ***LH/P MP-coated plates in hematopoietic progenitor growth medium (HPGM) supplemented with adequate cytokines and 4% fetal bovine serum (FBS)*** than those on ***uncoated plates***.

Sample no.2

JOURNAL OF CHILD NEUROLOGY
Impaired Social Behavior in Children With Benign Childhood Epilepsy With Centrotemporal Spikes
http://jcn.sagepub.com/content/27/2/156

Introduction

Benign childhood epilepsy with ***centrotemporal spikes***, also called ***rolandic epilepsy***, *is the most common* ***focal childhood epilepsy***. According to the ***International Classification of Epilepsies*** and ***Epileptic Syndromes***, the ***syndrome*** *is characterized by* brief, simple partial, ***hemifacial motor seizures***, with a tendency to evolve into ***generalized tonic–clonic seizures***. ***Onset*** *occurs between* ages 3 and 13 years (mean age at onset approximately 8 years). *There is a characteristic* ***electroencephalographic (EEG) correlate*** with

centrotemporal or ***midtemporal spikes*** that *tend to spread or shift from* side to side.

As evident by its name, the ***prognosis*** for becoming ***seizure free*** in ***benign childhood epilepsy*** with ***centrotemporal spikes*** *is excellent*, with 98% of children outgrowing the seizures by puberty. What about the ***cognitive dysfunction***, is it temporary as well? *Many authors have shown* some improvement in ***neuropsychologic function***. D'Alessandro et al, in a follow-up assessment of children who were free of both seizures and ***EEG abnormalities*** for more than 4 years, *found that* the problems in attention, language, and ***visuomotor coordination*** had disappeared.

Similar findings were reported by Lindgren et al, who tested ***benign childhood epilepsy*** with ***centrotemporal spikes*** in children 2 to 3 years after ***remission***; no difference between the children with ***benign childhood epilepsy*** with ***centrotemporal spikes*** and the control group *was noted*, except for verbal fluency. Hommet et al. analyzed cognition in 23 adolescents and young adults completely recovered from ***benign childhood epilepsy*** with ***centrotemporal spikes***. *No difference was noted between* the patients recovered from ***benign childhood epilepsy*** with ***centrotemporal spikes*** and 33 healthy controls with respect to memory, language, and executive functions. On the other hand, Papavasiliou *reported that* learning problems appear to persist even after the ***epilepsy*** has resolved. Given the recent ***frontal dysfunctions*** *reported in* ***benign childhood epilepsy*** with ***centrotemporal spikes***, *it was hypothesized that* these children *might also present* with ***impaired social cognition***. *It has been proposed that* ***Theory of Mind***, the ability to *make inferences regarding* the mental state, desires, and intentions of other individuals, *is a core component of* social cognition. *As originally defined*, ***Theory of Mind*** enables one to understand that mental states *can be the cause of* and thus *be used to explain and predict* the behavior of others.

In a recent study by Thirion-Marissiaux and Nader-Grosbois, *significant correlations* between developmental characteristics (***verbal and nonverbal cognition***) and ***Theory of Mind***–emotion abilities *were found*. Verbal cognition *explained* the understanding of causes and consequences of emotions, an important part of the ***variance*** of ***Theory of Mind*** results. Thus *the aim of the present study was to characterize* ***Theory of Mind*** abilities among individuals with ***benign childhood epilepsy*** with ***centrotemporal spikes*** and *compare them with* their ***cognitive evaluation***.

Features of a *Popular Science Article (PSA)*

- Main functions: descriptions, explanations, exemplifications, direct quotations.
- Grammar and syntax: simple clauses, active voice, few noun phrases. Question sentences, direct speech quotations.
- Vocabulary characteristics: scarce terminological (technical) and abundant semi-technical units. Metaphors, images, play-on-words.
- Metadiscourse: interactional markers like pronominalization, personification, some hedges and boosters. Direct relationship between sender and receiver.

In PSAs, terminology and lexical structures are balanced with functions and the interactional components (markers) are notably longer, more complex and with a very important role to play. This is due to PSAs communicative goal, which is to inform and entertain readers through scientific and technical news. Readers need to be hooked by the text. Therefore,

terminology and lexis in general cannot be dense nor complicated, functions are the strictly necessary ones, and interactional markers are varied, with a strong metaphorical input.

PSA's SAMPLES FROM TWO DIFFERENT FIELDS THAT SHOW RECURRENCE IN FUNCTIONS, INTERACTIONAL COMMUNICATION MARKERS AND TERMINOLOGICAL/LEXICAL ELEMENTS

Legend: 1. *Functions*

2. *Interactional (metadiscursive) markers*

3. ***Terminological/lexical elements (technical and semi-technical)***

Sample no.1

SCIENTIFIC AMERICAN

*Deadly Duo: Mixing Alcohol and **Prescription Drugs** Can Result in **Addiction** or Accidental Death*

http://www.scientificamerican.com/article.cfm?id=mixing-alcohol-prescription-drugs-result-addiction-accidental-death

Alcohol and Xanax, both found in Whitney Houston's hotel room right after she died, *inhibit the central nervous system and depend on* the same ***enzyme*** for bodily clearance

By Melinda Wenner Moyer | February 24, 2012 | 4

The mystery of Whitney Houston's death *will not be solved* for several weeks, as the Los Angeles County Coroner's Office awaits a ***full toxicology report***. But many experts *speculate that* the singer's tragic demise involved a *deadly* cocktail of alcohol and prescription drugs, including Xanax.

Houston *wouldn't be the first star to suffer such a fate*: Heath Ledger, Michael Jackson and Anna Nicole Smith *are all thought to have died* in part from ***prescription drug overdoses***, which can involve ***painkillers, sedatives and stimulants***, often in combination with alcohol. But the problem extends far beyond Hollywood. In 2007 some 27,000 Americans died from ***unintentional prescription drug overdoses***—making ***prescription drugs*** a *more common cause of* accidental death in many states than car crashes are.

A slippery slope

Although ***sedatives*** *are thought to have played* a role in Houston's death, most ***prescription drug overuse*** involves ***opioid painkillers***. Approximately 3 to 5 percent of people who take ***pain medication*** eventually *end up addicted*, according to Nora Volkow, director of the National Institute on ***Drug Abuse***, an arm of the U.S. National Institutes of Health. And "*individuals who have a past history of a substance-**use disorder**—from smoking, drinking or other drugs—are at greater risk," she says*. Addiction to other classes of prescription drugs such as ***sedatives, stimulants and sleep medications*** *is thought to be* less common—but it occurs, and even users who do not become *compulsively* addicted *can*, over time, *become physically dependent* and experience *intense* withdrawal symptoms when their prescriptions run out. They *might* also *develop* ***drug tolerance***, the need to take higher doses over time to feel the same effects.

Other people *start taking* ***prescription drugs*** just *to get high*, perhaps in part because *they have* the (*false*) notion that ***prescription drugs*** are safer to experiment with than are ***illicit drugs***. *"They take them for recreational purposes, and then a portion of them find 'Wow, I can't stop using this*,'" *says* Jon Morgenstern, director of ***addiction treatment*** at the Columbia University Medical Center.

Prescription drugs and alcohol *can be* a dangerous combination, *Volkow says*. ***Painkillers and booze*** are *perhaps the worst* to mix, because both slow breathing by different mechanisms and inhibit the ***coughing reflex***, creating "***a double-whammy effect***," *she says*, that *can stop* breathing altogether. Alcohol also interacts with ***anti-anxiety drugs*** (including Xanax), ***antipsychotics, antidepressants, sleep medications and muscle relaxants***—intensifying the drugs' sedative effects, causing ***drowsiness and dizziness***, and making falls and accidents *more likely*. A 2010 study published in the Canadian Journal of Public Health *reported that automobile drivers were much more likely to weave and speed if they were under the influence of drugs like Xanax in addition to alcohol than if they had consumed alcohol alone*. And according to a 2011 study published in the American Journal of Therapeutics, *people who visited an emergency room after taking too much of the sleeping drug Ambien were more than twice as likely to end up in an intensive care unit if they had also consumed alcohol, compared with Ambien-takers who had not had anything to drink.*

Sample no.2

SCIENTIFIC AMERICAN

*Does **Overeating** Cause **Memory Impairment** as We Age?*

Researchers *are in the early stages of* linking ***caloric intake*** to ***mild cognitive impairment***, the stage between normal ***age-related memory loss*** and early ***Alzheimer's disease***

http://www.scientificamerican.com/article.cfm?id=overeating-memory-loss

By Larry Greenemeier | February 23, 2012 | 6

Overeating *has been linked to* a *litany of* health problems—***diabetes, high blood pressure and stroke***, to name a few. ***Memory loss, dementia and even Alzheimer's*** *may* someday *be added to* that list, according to the preliminary findings of a study on aging conducted by the Mayo Clinic. Mayo researchers *caution against* reading too much into their work thus far correlating ***caloric intake*** in the elderly with the onset of ***mild cognitive impairment (MCI)***—the stage between ***normal age-related memory loss*** and early ***Alzheimer's disease***. Still, a report *they plan to present* in April at the American Academy of Neurology's 64th Annual Meeting in New Orleans *indicates that* overeating *may greatly increase* the risk of memory loss for elderly people.

In 2006 the Mayo Clinic *chose* a random sample of 1,233 people in Olmsted County, Minn., ages 70 to 89 years old (none previously diagnosed with ***dementia***) and asked them to *fill out a questionnaire describing* their diets over the previous year. Participants then *returned* the surveys to the clinic in Rochester, Minn., after which the researchers *grouped* the study participants into three categories: those whose ***daily caloric consumption*** was between 600 and 1,526 calories; between 1,526 and 2,143; and between 2,143 and 6,000. Each participant then underwent a series of ***MRI brain scans*** and ***cognitive tests***. Correlating ***caloric consumption*** with ***test performance***, researchers *concluded* the odds of having ***MCI*** more than doubled for those in the highest ***calorie-consuming group*** compared with those in the ***lowest calorie group***. There are several caveats to these findings, however. For instance, the report *did not take into account* the types of food and beverages consumed *nor did it examine* the rate at which food was eaten throughout a day.

Study author Yonas Geda *acknowledges that* the research to better understand the link between ***MCI*** and eating in the elderly is still preliminary, but he notes that it does create a foundation for more extensive ***cause-and-effect research***, which he and his colleagues are currently pursuing. *Scientific American spoke with* Geda, an associate professor of neurology and psychiatry at the Mayo Clinic in Scottsdale, Ariz., and co-chair of the clinic's ***Neuroscience Discipline Oriented Group***, about his team's efforts to identify the causes of ***memory loss*** in the elderly and what they plan to investigate in their ongoing research.

*What is mild **cognitive impairment**?*

With ***MCI***, the person is not demented. The person is functioning well, but *when you test them* on certain memory tests *they do poorly* as compared to their age-, education- and sex-matched peers. *We observed that* a ***daily caloric intake*** in excess of 2,143 was associated with a significant chance of having ***MCI***. *If I am consuming more than* 2,143 calories per day, *my* odds of having MCI is twice that of somebody that consumes 1,526 calories per day.

*How did researchers test for **MCI**?*

We determined whether participants had ***MCI*** based on three hours of testing when participants came to the Mayo Clinic to turn in their questionnaires. This *included* ***testing of memory***, language and also ***sense of direction***.

How was memory tested?

Participants *were asked to memorize* 15 different words and then *asked* over timed intervals *to remember* as many words as they could. A normal person *might remember* seven out of 15 words the first time they are asked, then *maybe* 10 words the second time and 13 words the next time. After a half hour *the person might remember* 12 out of 15. With ***Alzheimer's patients***, if give them 15 words to remember, they'll remember two initially. After a half hour, they won't remember any.

If we compare the two genres out of these four samples, it can be observed that, irrespective of the field of specialization (bio-medicine or neurology), RAs are far richer than PSAs in recurrent patterns dealing with rhetorical functions and lexis. Functions in RAs follow a strict model of scientific discourse conventions, with statements of report, descriptions, explanations and some proposals: *"is functionally characterized by…", "there are several recent reports that…", "are important cells for…", "are localized in…", "interact with…", "are not well known", "the purpose of this study is to evaluate", "we report here that".* Lexis presents a high density of recurrent patterns fundamentally formed by terminology elements, noun phrases and collocations: **in vitro capability", clonal aggregates, bone marrow microenvironment, generalized tonic–clonic seizures, stromal cells, extracellular matrix proteins, heparan sulfate proteoglycans, cytokines**, etc. As for the interactional function, it also obeys scientific conventions, since *hedges* (modals –can, could- and conditionals, together with epistemic verbs –*report, find, suggest, say*- are their most frequent markers, in order not to impose any findings to their readers (Salager-Meyer, 1994; Hyland, 1998; Gil-Salom, 2000; Suau-Jiménez 2010a): **"heparin *could be used* as a therapeutic agent", "mental states *can be the cause* of…"** . Therefore, ICT tools should be used here to operate on these particular recurrence elements.

PSAs, on the other hand, present different needs for translation trainees with respect to ICT tools. Although some technical lexis –terminology and semi-technical words- are always part of popular science: **calorie-consuming group, cognitive impairment, daily caloric intake**-, the register tenor conditions suggests that not a high number of terms be used, since the relation is between a semi-expert (science communicator) and the general public. Due to the fact that the genre's communicative purpose is to inform but also to entertain, a scope of linguistic licenses opens up, favoring the use of metaphorical language, images, play on words and even certain colloquial words at times. Functions in PSAs mirror, to some extent, those of RAs, including reports, descriptions, and explanations, but few proposals are observed and statements become an important functional strategy, since the non-imposition of findings and ideas is not anymore a must: *"inhibit the central system and depend on", "making prescription drugs a most common cause of death", "end up addicted", "will not be solved".* The interactional function, also known as metacommunication, varies enormously in comparison with that of RAs,

being, together with the aforementioned lexical features, one of the most salient traits of popular science and thus, necessary to be mastered by translation trainees (Nord, 2005, 2007; Suau-Jiménez 2005b, 2005c). Hedges are still used (can be, can stop), but new elements are included that draw the reader's attention because of their colloquial and/or emotional strength: **"double-whammy effect", "painkillers", "booze", "drowsiness", "dizziness", "coughing reflex".** These elements, although part of the lexical level, are used to create a closer relationship with the reader, thus acting as part of the aforementioned interactional function. These are, thus, the recurrence patterns where ICT tools can assist the translation trainee to create vocabulary and interactional markers' pools to be retrieved during the translation process.

6. Blending language and ITC

In order to establish a methodology that blends both language and translation skills together with technology we are basing our proposal on the classification of tools made by Melby (1998), who, according to Alcina (2008), works on the principle that a translator uses a myriad of tools in different points of the translation process. In this vein, he distinguishes two levels affecting terminology and segments, and three stages in which these tools can be used: before, during and after translation. Furthermore, he differentiates between two other types of tools that are not necessarily assigned to any of the two levels: the infrastructure and the tools for translation workflow and management. He summarizes this structure as follows:

INFRASTRUCTURE

	TERM LEVEL	SEGMENT LEVEL
BEFORE TRANSLATION	• Term candidate extraction • Terminology research	• New text segmentation, previous source-target text alignment, and indexing
DURING TRANSLATION	• Automatic terminology lookup	• Translation memory lookup • Machine translation
AFTER TRANSLATION	• Terminology consistency check and non-allowed terminology check	• Missing segment detection and format and grammar checks

TRANSLATION WORKFLOW AND BILLING MANAGEMENT

Figure 1: Tool classification according to Melby (1998)

For our proposal we will concentrate on the three key stages: before, during and after translation, leaving apart the infrastructure and the translation workflow and billing management tools. More specifically, we will consider three main types of tools that will help

us to carry out the different tasks that we propose for the translation process. Following both the classification of Melby (op. cit) and the one proposed by Alcina (op. cit), who classifies the components of translation technologies into five large blocks (The translator's computer equipment; Communication and documentation tools; Text edition and desktop publishing; Language tools and resources; Translation tools), we will implement the following tools in our methodology:

- Tools for documentation: browsers. Browsers can be used both for searching existing databases resources such as encyclopaedias, dictionaries and corpora with online access, and to gather resources such as parallel documents to build our own corpora.

- Text edition: once we have gathered the different resources, such as documents, we can use text edition tools to process them, for instance, tagging them. We can also process glossaries available on the Internet to convert them into a compatible format in order to import them into a Terminology Management System. Further, we can use the text editor to process the original text, marking the relevant structures and terminology.

- Language tools: once the corpora are built, we can use special tools in order to analyse the texts, being able to carry out specific searches, building concordances or creating frequency lists. Then, we can use language tools such as corpus analysis to study the source text and to automatically detect relevant structures and terminology.

- Computer Assisted Translation Tools, also known as CAT tools and coined by some authors such as Jost Zetzsche[1] as TEnTs (Translation Environment Tools). These tools usually comprise a number of applications and programs that might or might not be directly related with the translation process, but which are to a certain extent involved in it. Though the term CAT Tool is often used as a synonym for Translation Memory Tool (MT), this is not a very accurate term since the latter is rather a subcategory of the former. In any case, these tools or rather packages of tools include a Terminology Management System used to create and manage terminology databases and a Translation Memory Management System, used to create and manage translation memories, that is, bilingual corpora of aligned texts. Both tools tend to be

[1] See http://www.translatorstraining.com/mat/cat/cat_preview.htm [Last accessed 01/30/2011]

integrated in an editor and work together so that the professional translator can concentrate on the main task of translating.

6.1. Applying the three-phase model to the translation process

After applying all these tools to the different moments that Melby distinguishes in the translation process and after implementing genre functions, interactional communication and terminology of our two genres of interest (Research Article and the Popular Science Article), we come up with the following process:

6.1.1. Before translation

In the following table we can see the tasks that the translator has to accomplish before starting to translate:

Term-level	Segment-level	Tools
Analysis of the relevant terminology in the source text.	Analysis of the communicative or discursive functions and the metadiscourse of the source text	Text editor, tool for the analysis of corpora
Documentation phase to find equivalents	Documentation phase to find equivalents and to better understand the original text.	Online dictionaries and terminological databases, encyclopaedias, Internet queries.
Documentation phase to find relevant documents that can be used to build a terminological data base.	Documentation phase to find relevant documents with similar communicative functions and metadiscourse as the original text. Construction of a monolingual and/or a bilingual parallel corpus by aligning texts to use them subsequently for translation.	Advanced Internet queries, alignment tools.
Creation of a terminological database with the equivalents found and all the relevant information (definitions, examples of use etc.).		Terminology Management System.

	Creation of a translation memory containing the aligned bilingual texts found in the previous phase.	Translation Memory Management System.

This table shows how the source text can be analysed by tagging it beforehand with the specific terminology and functions with a specific corpus tool, in this case AntConc 3.2.1w[2]. This tool facilitates the analysis by allowing the search for specific patterns and collocations, concordances to see how the terminology works in context as well as the most common words used within the text, helping the translation student to detect which are the most relevant structures that will need to be considered during the translation process.

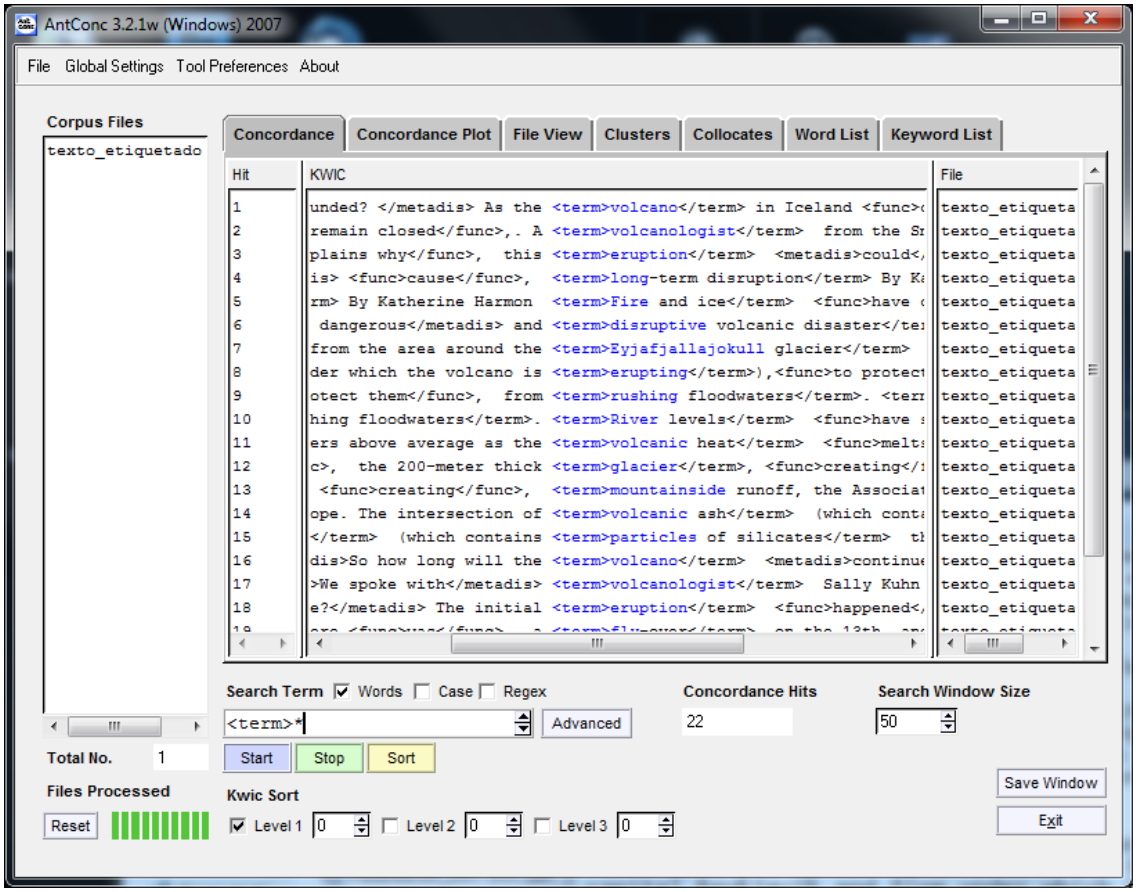

Figure 2: Analysis of source text with AntConc

Once the analysis is accomplished, the translator proceeds to store the relevant terminology and structures in a terminology database and in a translation memory as sub-

[2] The tools used are only examples. Any other tool with the same function would serve as well.

segments. In Figure 3 we can observe how terminology is stored in a database created with the tool Déjà Vu X. This information will help the translator afterwards, since the tool will automatically recognize these structures and will actively attract the translator's attention to these specific chunks in the text. Further, the terms and sub-segments are stored with metadata such as grammatical and context information that can then help the translator find the best possible equivalent.

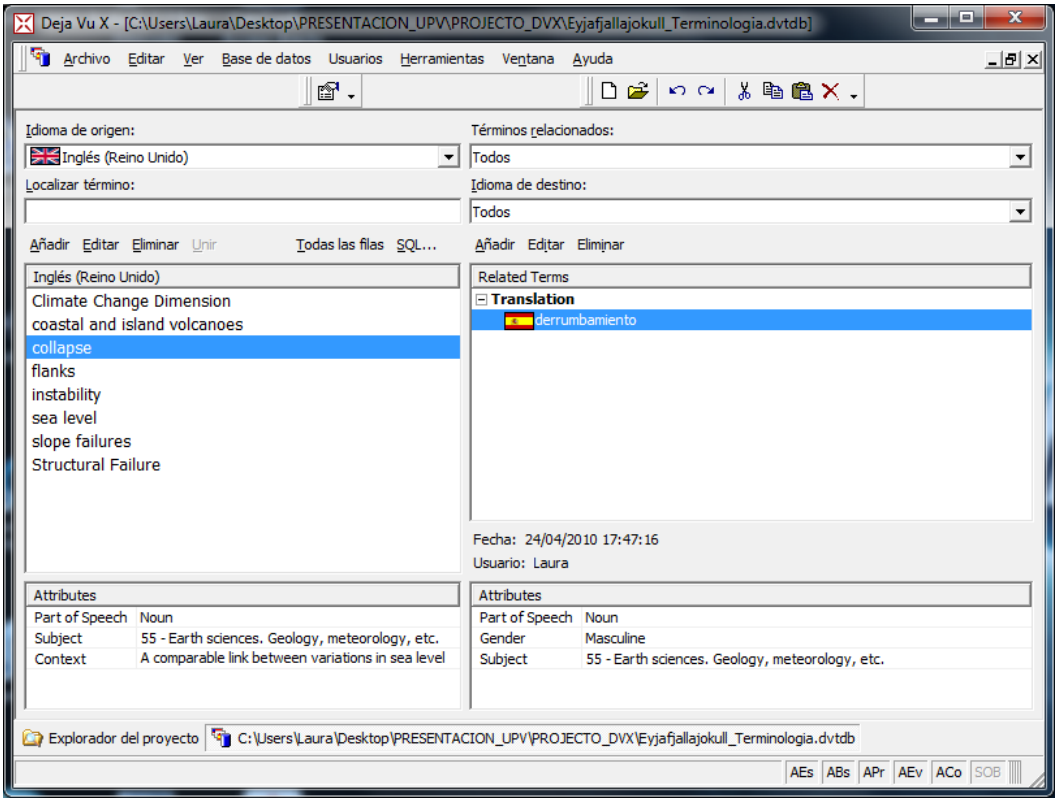

Figure 3: Terminology Database with Déjà Vu X

6.1.2. During translation

Once all resources have been created, the focus will be on the pure process of translation with the help of the two main components of a CAT Tool: the Terminology Management System and the Translation Memory System. All the effort invested in documentation and creation of resources will be reflected in this phase by facilitating the translation process.

Term-level	Segment-level	Tools
Active terminology recognition. Storing of new	Active segments and sub-segments recognition in the	Terminology Management System and Translation

terms.	translation memory. Storing of new segments and sub-segments (such as for instance structures that reflect communicative functions or metadiscourse characteristics of the text).	Memory System.

In this figure we can observe how the translator uses the previously stored resources (terminology and sub-segments) to carry out the translation task more efficiently. Terminology is marked in blue, whereas metadiscourse and functions are recognized as part of sub-segments of the translation memory and are marked in red:

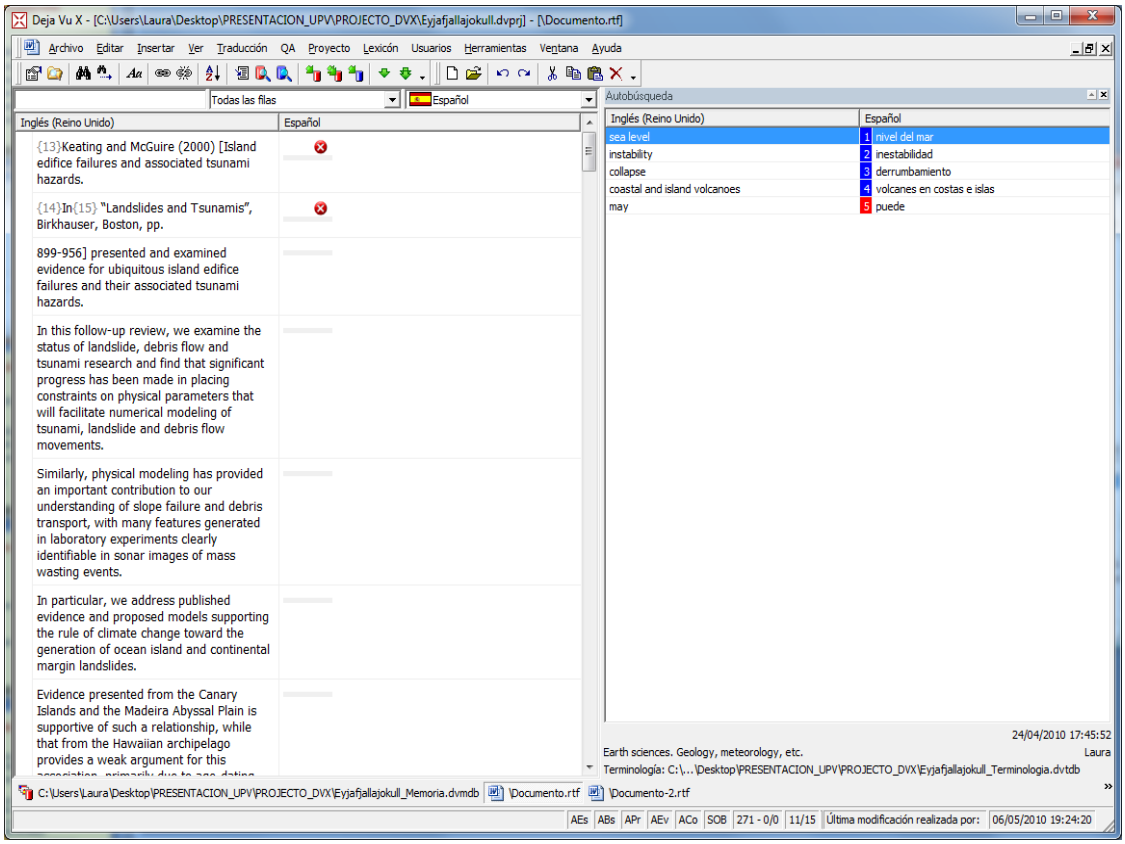

Figure 4: Translating with Déjà Vu X

6.1.3. After translation

Once the translation is accomplished, the final tasks will consist of reviewing and checking the final version of the text before delivering it to the client.

Term-level	Segment-level	Tools
Check if terminology has been correctly used and is coherent to the information stored in the database. In case it is not, correct or update database	Check that all segments have been translated. Check the internal coherence. Check the spelling, typos, and formal correction.	Terminology Management System and Translation Memory System. Editor or program where the source document was created.

Here we can use the automatic functions of the CAT Tool in order to detect possible inconsistencies, as we can see in Figure 5:

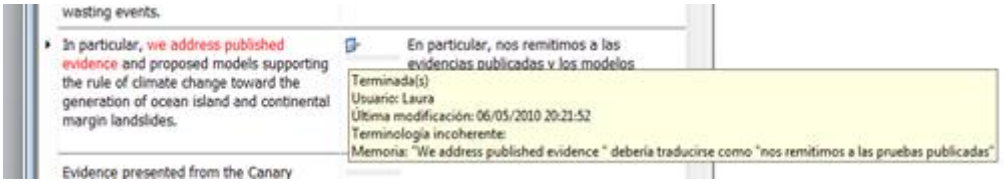

Figure 5: Inconsistency check in Déjà Vu X

As it can be observed, the first phase, before translation, where the student needs to prepare resources and work on the original text before s/he starts translating, is very much time- and effort-consuming. Students might feel frustrated with too much emphasis on this phase since they are eager to translate. However, it is necessary that the teacher insists on how important this previous task of analysis is in order to carry out a translation that fulfils the same communicative functions and genre purpose of the original.

7. Application in the classroom

This methodology can be applied in different ways in the classroom and always depending on diverse factors, such as number of students, computer literacy of both students and lecturers, the available infrastructure etc. An analysis of how technology and translation training is integrated in the classroom and how to deal with all these hurdles can be found in Suau-Jiménez & Ramírez-Polo (2010) and Ramírez-Polo & Ferrer-Mora (2010).

In general, we can think of two main ways in which to implement the suggested methodology:

- Individual work: in this setup every student accomplishes each of the tasks that we have defined in the previous paragraph. The student thus acts as a project

manager, a terminologist, a translator and a reviewer, learning to grasp the translation process from very different perspectives.

- Work in groups: in this setup students get organized in groups of at least three: one assumes the role of the terminologist and language resources manager; another assumes the role of the translator and finally, a third one assumes the role of the reviewer. Though we have not deepened into other kinds of tasks such as the creation of budgets and invoices and the communication with the client, a further role could be that of project manager, who would carry out administrative tasks. This setup has the advantage that every student is concentrated on each phase and learns how important it is to communicate with the other players in the process so that the translation meets the client's expectations or results in a high quality product, depending on the task that has been assigned to them.

Both setups can be combined so that students can go through both learning experiences. In the second scenario it is recommended that they switch roles during the course so that they do not end up with a partial but comprehensive view of the process.

8. Conclusions

As was anticipated in the Introduction, our attempt has been that of raising awareness on the importance of putting together communicative (linguistic) competences with procedural (instrumental) and evaluative ones (professional translation self-assessment) in the didactics of scientific and technical translation training, from the general viewpoint of Computed Aided Translation (CAT). Not only must the skilled translator master the ICT in her/his daily work, translation training can also benefit from the introduction of these technologies in the classroom in order to support the learning of linguistic and evaluative competences as well as the instrumental ones, which are implicit in the use of the different tools. With this methodology we aim at simulating the real environment of a professional translator and to provide students with the most appropriate linguistic and instrumental competences. Furthermore, the methodology reinforces the learning of linguistic skills by enabling students to focus on the most relevant aspects of the text in a systematic way. By combining both instrumental and linguistic skills, learning becomes reinforced reciprocally, thus benefiting both students and lecturers from a more integration-prone and real-world approach.

In order to effectively deploy this methodology, it is also necessary to take into account a number of factors such as number of students, lecturers' and students' computer literacy, as well as the technological infrastructure. In this respect, there are companies that offer commercial CAT Tools, but there is also a number of free software tools that can also serve our purpose, as Bowker, L., McBride, C. & Marshman, E. (2008) illustrate.

As has been described earlier in this paper, both discourse and terminology are essential linguistic aspects that need to be mastered by translation trainees. The field of science, as is the case with other specialized domains, displays a variety of genres that cater for the communicative needs of their discourse communities. Two of the most frequent genres, in terms of number of publications and therefore translation could be the Research Article (RA) and the Popular Science Article (PSA). Both have highly prescriptive generic structures, terminology and vocabulary traits, thus facilitating functional as well as lexical analyses, since recurrence is one of its most salient characteristics. As has been shown in our aforementioned samples for both Science and Popular Science, recurrence is a basic aspect that allows us to apply specific tools such as translation memories and terminological tools. Recurrence belongs to the idiosyncrasy of most professional and academic fields and genres, something more difficult to find in literary translation, where structural and lexical aspects are unlimited and far freer. It is therefore something we can take advantage of, especially in relation to translation didactics, since recurrence facilitates enormously the task of training students by creating language patterns they can always refer to. Obviously, students would first need to be trained in all the discursive and terminological aspects of science, including genre analysis –functions-, metadiscursive markers recognition and the command of terminology and vocabulary patterns; these tasks should ideally be carried out by a lecturer in linguistics. Another lecturer specialized in ICT should obviously complement the linguistic learning task by training students in the handling of all technological devices. The final result when training students following this methodology would certainly pay back, in terms of higher quality translations with better time-management and a more rational use of technological resources.

9. References

Alcina Caudet, Mª Amparo. 2008. "Translation Technologies Scope, Tools and Resources".*Target. International Journal of Translation Studies*, 20(1): 79-102

Askehave, I. & J. Swales. 2001. "Genre identification and communicative purpose: a problem and a possible solution". *Applied Linguistics* 22/2: 195-212.

Austermühl, F. 2003. “Training Translators to Localize.” Paper delivered to the conference Localization and Translator Training. Tarragona, Spain. November, 2003. Available at http://isg.urv.es/library/papers/Austermuehl_Training.pdf

Bowker, L., McBride, C. & Marshman, E. 2008. "Getting More than You Paid for? Considerations in Integrating Free and Low-Cost Technologies into Translator Training Programs".*Redit: Revista Electrónica de Didáctica de la Traducción y la Interpretación* 1: 26-47.<http://www.redit.uma.es [Lastaccessed 31/01/2012]>

Cabré, M. Teresa. 1998. *Terminology: Theory, methods and applications.*Philadelphia PA,John Benjamins, 248 p. [transl. of La Terminologia. La teoria, els mètodes, les aplicacions, Barcelona, Emúries, 1992].

Cabré, M. Teresa. 2010. "Terminology and translation". In Gambier, Yves; Van Doorslaer, Luc (ed.). *Handbook of translation studies.*Vol. 1. Amsterdam; Philadelphia: John Benjamins Publishing Company.356-365. ISBN 978-90-272-0331.

De Semir, V. 2000. “Comunicación científica. ¿Una asignatura pendiente?” España.<http://www.biomeds.net/biomedia//R22/editorial01.htm>

De Semir, V. 2010. “Science Communication & Science Journalism.” *Meta-Review*.Pompeu Fabra University, Barcelona, Spain.

García Izquierdo, I. 2000: *Análisis textual aplicado a la traducción.* Valencia: Tirant lo Blanch.

García Izquierdo, I. 2002: ‘El género: plataforma de confluencia de nociones fundamentales en didáctica de la traducción’. *Discursos, SérieEstudos de tradução 2*, UniversidadeAberta, Lisboa: 13-21

García Izquierdo, I. (ed.) 2005: *El género textual y la traducción: Reflexiones teóricas y aplicaciones pedagógicas.* Bern: Peter Lang. 267 pp. ISBN: 3-03910-676-7

Gazdar, G. 1981. “Unbounded dependencies and coordinate structure”. *Linguistic Inquiry 12*: 155–184.

Gil Salom, L. 2000/2001.”El discurso de la ciencia y la tecnología: el artículo científico de investigación vs. El artículo de divulgación científica”, RESLA 14, 429-449.

Halliday, M.A.K. & J. Webster (eds.). 2004. *The Language of Science*. The fifth volume of a series of the Collected Works of M.A.K. Halliday).London/ New York: Continuum. Hyland, Ken. 1998. Hedging in Scientific Research Articles. Amsterdam/Philadelphia: John Benjamins.

Hyland, Ken. 1998. Hedging in Scientific Research Articles. Amsterdam/Philadelphia: John Benjamins.

Hurtado Albir, A. (ed.) 1994. *Estudis sobre la Traducció*. Castelló: Publicacions de la Universitat Jaume I.

Melby, Alan K. 1998. Eight Types of Translation Technology. <www.ttt.org/technology/8types.pdf>

Nord, Christiane. 2000. "What do we know about the target-text receiver?" En: Beeby, A., Ensinger, D. y Presas, M. (eds) Investigating Translation, 195-212. John Benjamins Publisings Company.

Nord, Christiane. 2005. Text Analysis in Translation. Amsterdam, New York: Editions Rodopi.

Nord, Christiane. 2005. "Training functional translators". In: Tennent, M. (ed) Training for the New Millenium, 209-223. John Benjamins Publishings Company.

Nord, Christiane. 2007. "The phatic function in translation: metacommunication as a case in point". In: Vandeweghe, W., Vandepitte, S. y Van de Velde, M. (eds), 171-184. John Benjamins Publishings Company.

Pérez González, L.; Rico Pérez, C. 2001. Enhancing process-research in translation training: Towards a collaborative management of classroom dynamics, in La lingüísticaaplicada a finales del siglo XX. Vol II. Alcalá de Henares: Servicio de Publicaciones de Alcalá, 2001, pp. 861-864.

Ramírez Polo, Laura, & Ferrer Mora, Hang. 2010. "Aplicación de las TIC en Traducción e Interpretación en la Universidad de Valencia: experiencias y reflexiones". *Redit: Revista Electrónica de Didáctica de la Traducción y la Interpretación, 4*: 23-41.

Salager-Meyer, F. 1994. Hedges and Textual Communicative Function in medical English written discourse. English for Specific Purposes, 13 (2), 149-70.

Schäffner, C. 2002. The role of discourse analysis for translation and in translator training. Clevedon: Multilingual Matters

Schäffner, C. 2004. Interview. The Journal of Specialized Translation. http://www.jostrans.org/index.php

Suau Jiménez, F. 2010a. "Metadiscursive elements in the translation of scientific texts" In: Gea-Valor, Maria-Lluisa / García-Izquierdo, Isabel / Esteve, Maria-José (eds) *Linguistic and Translation Studies in Scientific Communication.* Studies in Language and Communication Vol. 86. PETER LANG Publishing Group. 317 pp.

Suau Jiménez, F. 2005b. "Metadiscourse in Research and Popular Science Articles or how to please the audience: a cross-generic and intra-generic analysis in search of a common metadiscursive core". Paper. IpRA (International Pragmatics Association) Conference, July 2005. Riva del Garda, Italy.

Suau Jiménez, F. 2005c. "Matizadores discursivos frente a elementos apelativos y fáticos en artículos científicos". En: Gil Salom, L. y Aguado de Cea, G. RESLA. ESTUDIOS SOBRE LAS LENGUAS DE ESPECIALIDAD EN ESPAÑA. Volumen Monográfico, pp. 125-134.

Suau Jiménez, F. y Ramírez-Polo, L. 2010c. "Las condiciones profesionales del traductor especializado: propuesta basada en las TIC". In: Manuel García, Paulina Ribera, Adela Costa, María D. García, Pilar García, Angustias Iglesias, Mateo del Pozo y Carmen Rodríguez (eds.) INTERACCIÓ COMUNICATIVA I ENSENYAMENT DE LLENGÜES. Publicacions de la Universitat de València (PUV). ISBN: 978-84-370-7206-7